Area: Science and Engineering
Dean: Dr. Rina Roy
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ARC's program provides the foundation in mathematics, physics, and engineering necessary to transfer to a four-year institution and complete a bachelor's degree in engineering. Students should consult the institution to which they wish to transfer for the specific lower division requirements.

Most lower division engineering programs require the following ARC courses: Mathematics 400, 401, 402, 420; Physics 410, 421, 431; Chemistry 400, and Engineering 401, 413, 420, 430. See also *Design & Engineering Technology*.

ENGR 300 Introduction to Engineering 1 Unit
Advisory: ENGWR 102 or 103 and ENGRD 116 or ESLR 320 AND ESLW 320.
Course Transferable to UC/CSU
Hours: 18 hours LEC
This course is an introduction to the engineering and engineering technology professions and their place in industry. It includes an explanation of engineering and engineering technology options and curricula involved. The topics include an emphasis on problem-solving techniques used in engineering and engineering technology. This course is recommended for all entering engineering, engineering technology and design technology students.

ENGR 305 Basic Technical Drawing 3 Units
Advisory: ENGWR 102 or 103 and ENGRD 116; or ESLR 320 and ESLW 320, or placement through the assessment process.
Course Transferable to CSU
Hours: 36 hours LEC; 72 hours LAB
This course introduces the graphical tools and instruments used to generate, analyze and interpret engineering drawings. This class is required for engineering students. Topics include lettering, geometric construction, or orthographic projection, auxiliary drawings, sectioning, and dimensioning.

ENGR 307 Industrial Materials Testing 3 Units
Prerequisite: MATH 100 or 104 with a grade of "C" or better
Advisory: MATH 120 or 124
Course Transferable to CSU
Hours: 54 hours LEC; 36 hours LAB
This course covers the basic properties of materials used in industry. The course emphasizes the practical use of the materials, but uses sufficient theory to understand these applications well. The course covers metals, concretes, plastics, ceramics, glasses, wood, and other composites. This course is primarily intended for design technology, engineering technicians and other technical students.

ENGR 310 Engineering Survey Measurements 4 Units
Prerequisite: MATH 330.
Advisory: ENGWR 102 or 103, and ENGRD 116; or ESLR 320 and ESLW 320.
Course Transferable to UC/CSU
Hours: 54 hours LEC; 54 hours LAB
This course covers the basic fundamentals of surveying for engineers. Electronic surveying instruments are used in this course to develop the principles of measurement for distance, elevations and angles. Additional topics include discussions on systematic and random errors, line directions, profiles and cross-sections, traverse computations, horizontal and vertical curves, and earthwork quantity calculations. This course is intended for civil engineers, but may also be required for other programs. (CAN ENGR 10)

ENGR 312 Engineering Graphics 3 Units
Prerequisite: ENGR 305 with a grade of "C" or better
Course Transferable to UC/CSU
Hours: 36 hours LEC; 72 hours LAB
This course applies the graphical tools needed to analyze, interpret, and solve engineering problems. The engineering design process is taught using manual and introductory interactive computer-aided design and drafting (CADD) tools to solve typical three-dimensional engineering problems. Topics include descriptive geometry, vector graphics, orthogonal projection, and primary and secondary auxiliary views. This course is intended for mechanical and civil engineering majors, but may also be required for other programs.

ENGR 320 Manufacturing Processes 3 Units
Course Transferable to UC/CSU
Hours: 36 hours LEC; 54 hours LAB
This course covers the principles of manufacturing processes in the areas of material removal, forming, joining and casting, and the fundamentals of numerical control. Topics include the application of equipment such as lathes, milling machines, drill press machines, saws, grinders, welders, molding equipment, and core makers. It includes hands-on experience in welding and machinery operation.

ENGR 401 Introduction to Electrical Circuits and Devices 3.5 Units
Prerequisite: PHYS 421 with a grade of "C" or better
Corequisite: MATH 420
Course Transferable to UC/CSU
Hours: 54 hours LEC; 36 hours LAB
This course covers the basic fundamentals of electrical circuit theory and analysis for engineers. Topics include circuit analysis techniques, sinusoidal analysis, phasors, first- and second-order circuits with natural and step responses, operational amplifiers, and average power. This course is intended to provide a solid foundation for upper division engineering courses.

ENGR 413 Properties of Materials 4.5 Units
Prerequisite: CHEM 400 and PHYS 410 with grades of "C" or better
Advisory: ENGWR 300 and ESLR 340
Course Transferable to UC/CSU
Hours: 72 hours LEC; 27 hours LAB
This is an introductory course in properties of materials used in engineering. This course places emphasis upon the theory underlying the behavior of engineering materials. The course includes a laboratory component, in which work will cover the testing of metals, polymers, composites, wood and other materials.

ENGR 420 Statics 3 Units
Prerequisite: MATH 401 and PHYS 410 with grades of "C" or better.
Advisory: ENGR 305 or DESGN 300, and MATH 410.
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course covers the study of bodies in equilibrium with emphasis on force systems, structures, distributed loads, friction and virtual work. In this course, analytical rather than graphical methods of problem solving will be emphasized. (CAN ENGR 8)

ENGR 428 Engineering Mechanics 3 Units
Prerequisite: Physics 410 with a grade of "C" or better.
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course covers the study of bodies in equilibrium with emphasis on structures and friction, including methods to calculate centroids and moments of inertia. It also includes the fundamental principles of kinematics and kinetics, and the study of motion and force analysis of particles and rigid bodies.

ENGR 430 Dynamics 3 Units
Prerequisite: ENGR 420 and MATH 402 with grades of "C" or better
Advisory: MATH 420
Course Transferable to UC/CSU
Hours: 54 hours LEC
This course covers the basic fundamentals of dynamics for engineers. Topics include kinematics and kinetics of particles; systems of particles and rigid bodies; systems with fixed and rotating axes; and the equations of motion, energy, and momentum.